TELERADAR

A report was made in the May 1955 issue of the International Hydrographic Bulletin regarding tests being carried out in the port of Havre of an instrument combining the advantages of radar and television. The Compagnie Française Thomson-Houston, *which constructed the equipment and is making the necessary adjustments for the Light-house and Beaconage Administration, has forwarded, at the Bureau's request, descriptive material in the shape of a pamphlet entitled TELERADAR, issued by the Compagnie Française Thomson-Houston, Groupe Electronique, 173, boulevard Haussmann, Paris* (8e). *Extracts therefrom are reproduced below.*

Radar alone is not the answer to every problem... and in the field of maritime navigation is subject to definite limitations.

A shipborne radar instrument displays a chart whose centre is the permanently shifting local transmitter. Interpretation of the chart is difficult, owing to the existence of fixed or moving echoes and interference (the whitish spot caused by broken water, interference from nearby radar equipment), etc. The aerial, being located at a relatively low level, is not always provided with adequate clearance above the waterline, and observations by shipborne radar are limited by the aerial's visual horizon.

Equipment performance, and particularly the fineness of the radar display, are limited by rigid installation specifications, and overall vision is consequently not as thorough and accurate as would be desirable. Without any underestimation of the possibilities of shipborne radar, it must nevertheless be considered as inadequate for the navigator when approaching a port or obstacle.

Normal operation of a port radar installation also presents major drawbacks. Although the transmitting aerial may be larger (resulting in improved definition), remote control calls for important responsibilities on the part of the operator in charge of directing the ship. There is invariably a certain reticence in blindly complying with orders originating from a distant agent completely unaware of local conditions.

Furthermore, echo identification is a critical operation, and final interpretation is a one-sided process; telephonic communication becomes rapidly saturated under heavy traffic conditions, and the use of an increased number of repeaters as a palliative agent may lead to unforeseen errors and the congestion of transmission.

In actual fact, shipborne radar does not provide absolute security, and port radar merely ensures a measure of control from the outside, thus obviating the possibility of intervention.

A solution to the above disadvantages has been found by retransmitting the picture appearing on the radar screen to the ship, and an installation has been set up for this purpose in Havre (Fig. 1).

The equipment consists of a television device which transmits the display of the port radar instrument supervising seaborne traffic.

The radar equipment is operated to supervise and control ships' movements within a radius of 50 km. (31 miles) around the port. The picture on the radar screen appears as a luminous chart which may be examined according to various scales, each corresponding to areas of different radius. Moving echoes, which represent the ships, and fixed echoes of a distinctive type corresponding to the beacons marking the ship channel, as well as bright spots indicating objects above the water-line (jetties, coastline) may be seen on the chart.

The tests being carried out at the Havre Signal-Station have now proceeded beyond the experimental stage, and *it is possible for a ship equipped with a suitable television receiver to apply itself the information supplied by the port radar equipment.*

Before the television transmitter was installed, the piloting of the ship by radar was carried out by the port officer, who interpreted the display and transmitted the information to the ship by V.H.F. radio telephone. The drawback of this method was the dependence of the commanding officer on verbal information originating from shore, subject to all the error possibilities such a method of transmission might entail.

The Teleradar system essentially consists of the following :

Port equipment : a *radar-television transformer* (Fig. 2), *high-frequency transmitter,* and *transmitting aerial.*

Ship equipment : a *television receiver* (Fig. 3), powered by a *receiving aerial.*

The linking circuit is of the type conventionally used by the « Radiodiffusion-Télévision Française », and the picture appearing on the receiver screen is identical to the port radar display.

The *Radar-Television Transformer* consists of a small-sized camera (200 × 180 × 120 mm.) coupled by a multiple conductor to a control box housing the power supply, synchro-generator and sweep generator, video-frequency amplifier, and the video monitor receiver reproducing the radar indicator image.

The cathode screen of the image transformer is provided with a relative amount of persistency, thus retaining the traces, supplied by the impact of the sweep, producing the radar image. Use of a conventional type of analyzer would produce a dazzling effect, since the beam of the sweep is much brighter than the persistent trace. A remedy to this difficulty had to be found, and the original solution adopted by the Compagnie Française Thomson-Houston consists in the direct recording of the beam by means of a long-memory analysing tube, in such a way that the afterglow on the screen no longer interferes with transmission. Luminous intensity is thus brought within the range of the brilliance of echoes normally observed on radar screens.

The radar-television transformer operates on the standard pattern of 637 interlaced lines at 50 lines per second. It supplies the video-frequency modulation and synchro-signals. Video modulation may be either positive or negative, and polarity reversed through the agency of a switch of the control box.

Two methods of reproduction of the radar display are thus available : one *positive,* the harbour, coast, beacons and ships being shown by luminous dots

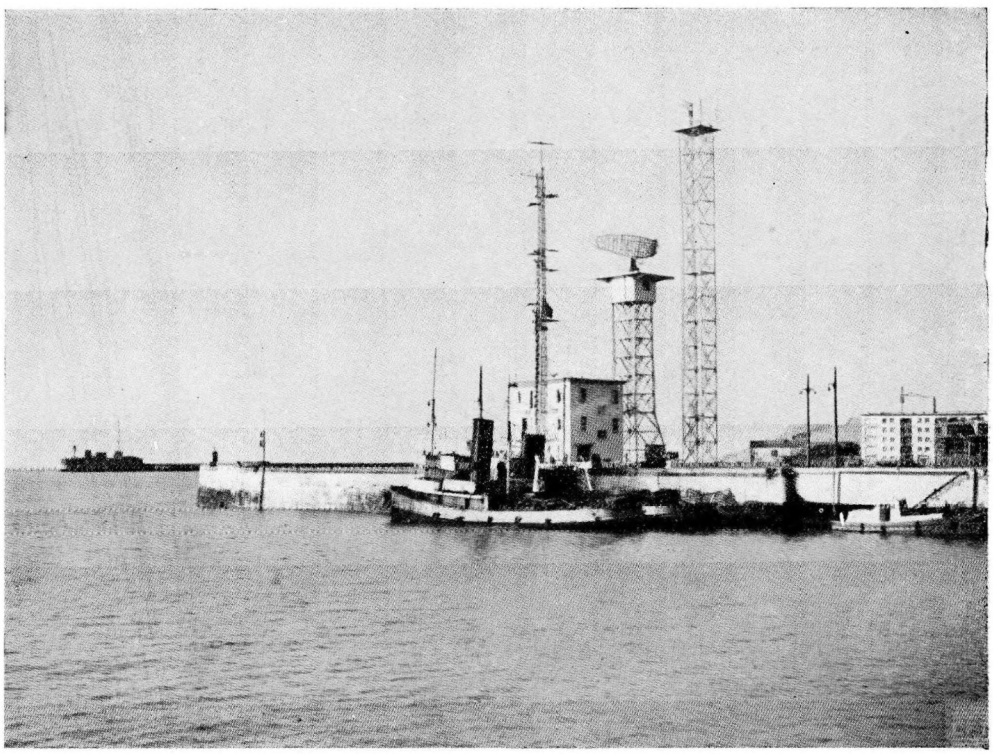

Fig. 1.

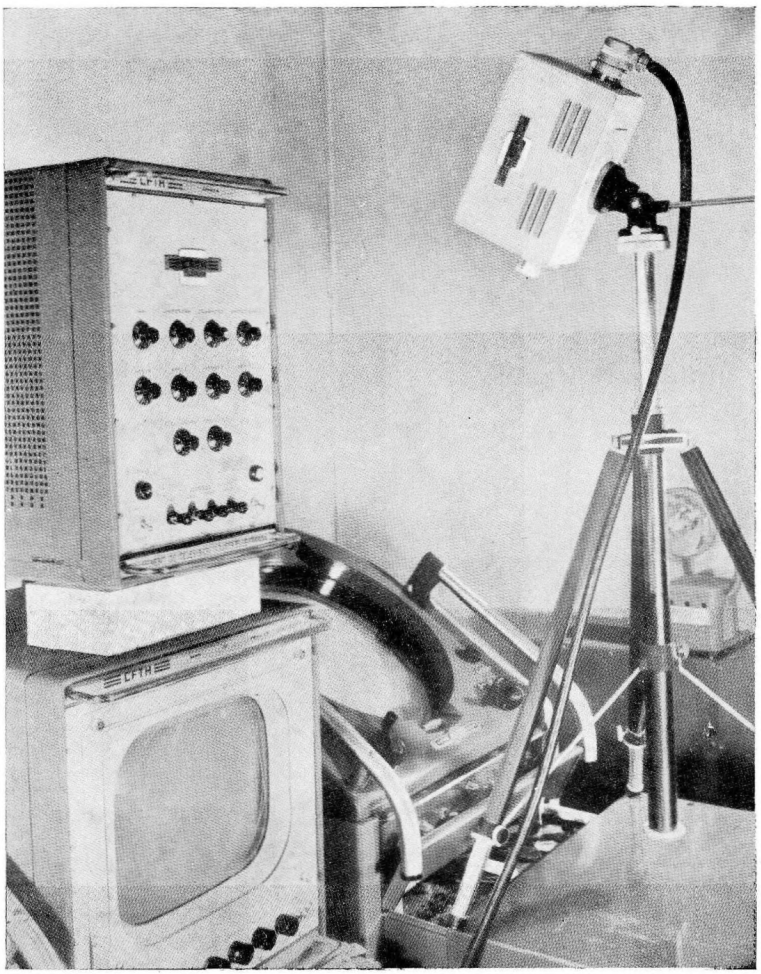

Fig. 2.

RADAR DISPLAY TRANSFORMER

This camera, which is directed towards the radarscope, is équiped with a photoconductive analyser tube, the latter's memory being especially adapted for retransmission of the radar image.

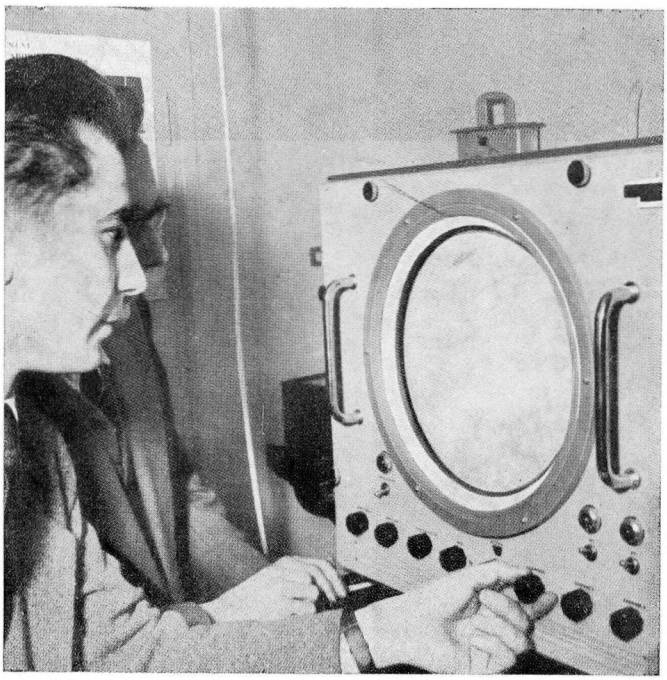

Fig. 3.

TELEVISION RECEIVER

The shipborne equipment has been so designed as to receive the transmitted signals even under the poorest conditions.

The radarscope image is reproduced on a circular screen 31 cm. in diameter.

and dashes against a dark background; and the other *negative*, the dots and dashes then appearing as black objects against a light background, as on a nautical chart. The modulated signals are transmitted to a high-frequency 50-watt transmitter. The carrier frequency is selected within the 450-80 MHz band. The radiation pattern of the aerial is such that it provides coverage for the entire maritime area concerned.

Various additional items of information may be transmitted by the teleradar instrument. The commanding officer may thus request by radio that the signal representing his ship be identified. A luminous arrow is then placed on the screen of the port radar receiver, pointing towards the desired signal. The image of the arrow may then be seen by the observer on his own receiver screen. In the same way, numerous other data, whether in the shape of conventional symbols, letter or number-groups, may be superimposed on the radar picture proper when it is reproduced on the television screen.